

ACADEMIC APPOINTMENTS:

Washington University, Saint Louis, MO
June 2024-Present
Postdoctoral Research Associate, Department of Physics.
Supervisor: Jim Buckley

EDUCATION:

Washington University, Saint Louis, MO
August 2019-May 2024
Ph.D. in Computer Science
Dissertation: **Improved Models of Elastic Scheduling**

Washington University, Saint Louis, MO
August 2016-May 2018
M.S. in Computer Science
Graduate Certificate in Data Mining & Machine Learning

Washington University, Saint Louis, MO
Graduated May 2013
B.A. in Physics and Mathematics

PUBLICATIONS:

Sanjoy Baruah, Pontus Ekberg, Marion Sudvarg. **Learning-Assisted Schedulability Analysis: Opportunities and Limitations**. Real-Time Systems, Springer, Summer 2025. (Accepted, to appear.)

Ao Li, Marion Sudvarg, Zihan Li, Sanjoy Baruah, Chris Gill, Ning Zhang. **A Unified Hardware Performance Profiling Infrastructure to Measure and Manage Uncertainty**. USENIX Symposium on Operating Systems Design and Implementation (OSDI), July 2025. (Accepted, to appear.)

Daisy Wang, Ye Htet, Marion Sudvarg, Roger Chamberlain, Jeremy Buhler, James Buckley. **Coordinating Instruments for Multi-Messenger Astrophysics**. Invited paper at the Special Session on Computer Architectures in Space (CompSpace), May 2025, held in conjunction with Computing Frontiers.

Mario Günzel, Marion Sudvarg, Max Deppert, Ao Li, Ning Zhang, Jian-Jia Chen. **Optimal Priority Assignment for Synchronous Harmonic Tasks With Dynamic Self-Suspension**. IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), May 2025.

Marion Sudvarg, Andrew Clark, Chris Gill. **Integrated Real-Time Control and Scheduling for Safety Critical Cyber-Physical Systems**. IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), May 2025.

Benjamin Standaert, Fatima Raadia, Marion Sudvarg, Sanjoy Baruah, Thidapat Chantem, Nathan Fisher, Christopher Gill. **A Limited-Preemption Scheduling Model Inspired by Security Considerations**. Leibniz Transactions on Embedded Systems (LITES), Volume 10, Issue 1, April 2025.

Marion Sudvarg, Daisy Wang, Jeremy Buhler, Chris Gill. **Subtask-Level Elastic Scheduling**. IEEE Real-Time Systems Symposium (RTSS), December 2024.

Benjamin Standaert, Marion Sudvarg, Fatima Raadia, Chris Gill. **ILP Representations of Multi-Phase Limited-Preemption Tasks**. The Second Workshop on Optimization for Embedded and Real-time systems (OPERA), December 2024. Held in conjunction with RTSS 2024.

Ye Htet, Marion Sudvarg, Andrew Butzel, Jeremy Buhler, Roger Chamberlain, James Buckley. **Machine Learning Aboard the ADAPT Gamma-Ray Telescope**. The Fifth Workshop on Artificial Intelligence and Machine Learning for Scientific Applications (AI4S), November 2024. Held in conjunction with SC 2024.

Zhuoran Sun, Marion Sudvarg, Chris Gill. **Elastic Scheduling for Graceful Degradation of Mixed-Criticality Systems**. International Conference on Real-Time Networks and Systems (RTNS), November 2024.

Marion Sudvarg, Chris Gill, Sanjoy Baruah. **Improved Implicit-Deadline Elastic Scheduling**. IEEE International Symposium on Industrial Embedded Systems (SIES), October 2024. **Outstanding Paper**.

Marion Sudvarg, Oren Bell, Tyler Martin, Benjamin Standaert, Tao Zhang, Sun-Beom Kwon, Chris Gill, Arun Prakash. **Towards a Concurrency Platform for Scalable Multi-Axial Real-Time Hybrid Simulation**. *Frontiers in Built Environment*, Sec. Earthquake Engineering, Volume 10, August 2024. Invited paper as part of the special issue, "Experimental Benchmark Control Problem on Multi-axial Real-time Hybrid Simulation."

Marion Sudvarg, Ye Htet, Sanjoy Baruah, Jeremy Buhler, Roger Chamberlain, Chris Gill, Jim Buckley. **Adaptive Execution for Real-Time Observations of Astrophysical Transients**. 13th International Real-Time Scheduling Open Problems Seminar (RTSOPS), July 2024. Held in conjunction with ECRTS 2024.

Marion Sudvarg, Ao Li, Daisy Wang, Sanjoy Baruah, Jeremy Buhler, Pontus Ekberg, Chris Gill, Ning Zhang. **Elastic Scheduling for Harmonic Task Systems**. IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), May 2024. **Artifact Evaluated**.

Marion Sudvarg, Chenfeng Zhao, Ye Htet, Meagan Konst, Thomas Lang, Nick Song, Roger D. Chamberlain, Jeremy Buhler, James H. Buckley. **HLS Taking Flight: Toward Using High-Level Synthesis Techniques in a Space-Borne Instrument**. 21st ACM International Conference on Computing Frontiers (CF), May 2024. **Artifact Evaluated, Available, Reproduced**.

Marion Sudvarg, Ye Htet, Jeremy Buhler, Roger Chamberlain, Chris Gill, James Buckley, Wenlei Chen. **Adaptive Real-Time Computation for Prompt Localization of Transients**. 21st Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2024. (Poster Only)

Ye Htet, Marion Sudvarg, Jeremy Buhler, Roger Chamberlain. **A Computational Pipeline for Prompt Gamma-Ray Burst Localization Aboard APT and ADAPT**. 21st Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2024. (Poster Only)

Jamie Shin, Marion Sudvarg, Jeremy Buhler, James Buckley. **Accelerating Compton Imaging of Astrophysical Sources in Python**. 21st Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2024. (Poster Only)

Marion Sudvarg, Zhuoran Sun, Ao Li, Ning Zhang, and Chris Gill. **Priority-Based Concurrency and Shared Resource Access Mechanisms for Nested Intercomponent Requests in CAMkES.** *Real-Time Systems*, Springer, 2024. (Special issue on selected papers from RTCSA 2022.)
Also presented as a Work-already-Published at the 42nd IEEE Real-Time Systems Symposium (RTSS 2023).

Marion Sudvarg, Chris Gill, Jeremy Buhler. **Subtask-Level Elasticity for Federated Scheduling of Parallel Tasks.** The First Workshop on OPTimization for Embedded and ReAl-time systems (OPERA), December 2023. Held in conjunction with RTSS 2023.

Ye Htet, Marion Sudvarg, Jeremy Buhler, Roger D. Chamberlain, and James Buckley. **Localization of Gamma-ray Bursts in a Balloon-Borne Telescope.** The First Workshop on Enabling Predictive Science with Optimization and Uncertainty Quantification in HPC (EPSOUQ), November 2023. Held in conjunction with SC 2023.

Marion Sudvarg, Jeremy Buhler, Roger Chamberlain, Chris Gill, James Buckley and Wenlei Chen. **Parameterized Workload Adaptation for Fork-Join Tasks with Dynamic Workloads and Deadlines.** The 29th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), August 2023.

Marion Sudvarg et al. **Front-End Computational Modeling and Design for the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope.** In *Proc. of 38th International Cosmic Ray Conference – PoS(ICRC2023)*, July 2023.

Ye Htet, Marion Sudvarg, et al. **Prompt and Accurate GRB Source Localization Aboard the Advanced Particle Astrophysics Telescope (APT) and its Antarctic Demonstrator (ADAPT).** In *Proc. of 38th International Cosmic Ray Conference – PoS(ICRC2023)*, July 2023.

Wenlei Chen, James H. Buckley, et al. **Simulation of the instrument performance of the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope in the presence of the MeV background.** In *Proc. of 38th International Cosmic Ray Conference – PoS(ICRC2023)*, July 2023.

Marion Sudvarg, Sanjoy Baruah, Chris Gill. **Elastic Scheduling for Fixed-Priority Constrained-Deadline Tasks.** 26th IEEE International Symposium on Real-Time Distributed Computing (ISORC), May 2023. **Best Paper.**

Marion Sudvarg, Meagan Konst, Thomas Lang, Diana Pacheco-Garcia, Roger Chamberlain, Jeremy Buhler, James Buckley. **Design of Front-end Signal Processing for the Advanced Particle-astrophysics Telescope.** 20th Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2023. (Poster Only)

Ye Htet, Marion Sudvarg, Jeremy Buhler, Roger Chamberlain, James Buckley. **Prompt, Accurate Localization of Gamma-Ray Bursts in the Advanced Particle-astrophysics Telescope.** 20th Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2023. (Poster Only)

Wenlei Chen, James Buckley, Roger Chamberlain, Marion Sudvarg. **The Advanced Particle-astrophysics Telescope: Reconstruction of the MeV gamma-ray sky and estimation of point-source sensitivity in the presence of the background.** 20th Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2023. (Poster Only)

Ao Li*, Marion Sudvarg*, Han Liu, Zhiyuan Yu, Chris Gill and Ning Zhang. **PolyRhythm: Adaptive Tuning of a Multi-Channel Attack Template for Timing Interference.** IEEE Real-Time Systems Symposium (RTSS), Houston, Texas, December 2022.
Also presented as “Demo: Adaptive Tuning of a Multi-Channel Attack Template for Timing Interference” at VehicleSec 2024 held in conjunction with NDSS.

M. Sudvarg and C. Gill. **A Concurrency Framework for Priority-Aware Intercomponent Requests in CAMkES on seL4**. The 28th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), August 2022. **Best Paper**.

M. Sudvarg, J. Buhler, R. Chamberlain, C. Gill, and J. Buckley. **Work in Progress: Real-Time GRB Localization for the Advanced Particle-astrophysics Telescope**. 16th annual workshop on Operating Systems Platforms for Embedded Real-Time Applications (OSPRT), July 2022. Held in conjunction with ECRTS 2022.

M. Sudvarg and C. Gill. **Analysis of Federated Scheduling for Integer-Valued Workloads**. International Conference on Real-Time Networks and Systems (RTNS), June 2022.

Jacob Wheelock, William Kanu, Marion Sudvarg, Zhili Xiao, Jeremy D. Buhler, Roger D. Chamberlain, and James H. Buckley. **Supporting multi-messenger astrophysics with fast gamma-ray burst localization**. In *Proc. of IEEE/ACM HPC for Urgent Decision Making Workshop (UrgentHPC)*, November 2021. Held in conjunction with SC 2021.

Marion Sudvarg, Jacob Wheelock, Jeremy D. Buhler, James H. Buckley, and Wenlei Chen. **Parallel GRB source localization pipelines for the advanced particle-astrophysics telescope**. In *Proc. of IEEE/ACM International Conference for High Performance Computing, Networking, Storage, and Analysis (SC)*, November 2021.

Sudvarg, M., Gill, C. & Baruah, S. **Linear-time admission control for elastic scheduling**. *Real-Time Syst* **57**, 485–490 (August 2021).

Also presented as a Work-already-Published at the 42nd IEEE Real-Time Systems Symposium (RTSS 2021).

Marion Sudvarg, Jeremy Buhler, James H. Buckley, Wenlei Chen et al. **A Fast GRB Source Localization Pipeline for the Advanced Particle-astrophysics Telescope**. In *Proc. of 37th International Cosmic Ray Conference — PoS(ICRC2021)*, volume 395, pages 588:1–588:9, July 2021.

James Buckley, Samer Alnussirat, Corrado Altomare, et al. **The Advanced Particle-astrophysics Telescope (APT) Project Status**. In *Proc. of 37th International Cosmic Ray Conference — PoS(ICRC2021)*, volume 395, pages 655:1–655:9, July 2021.

Wenlei Chen, James H. Buckley, Samer Alnussirat, et al. **The Advanced Particle-astrophysics Telescope: Simulation of the Instrument Performance for Gamma-Ray Detection**. In *Proc. of 37th International Cosmic Ray Conference — PoS(ICRC2021)*, volume 395, pages 590:1–590:9, July 2021.

Zachary Hughes, Samer Alnussirat, Corrado Altomare, et al. **Characterization of a prototype imaging calorimeter for the Advanced Particle-astrophysics Telescope from an Antarctic balloon flight and CERN beam test**. In *Proc. of 37th International Cosmic Ray Conference — PoS(ICRC2021)*, volume 395, pages 137:1–137:9, July 2021.

INVITED TALKS:

July 2024: Industrial Challenge, ECRTS

Submitted an early-stage proposal for the annual industrial challenge at the 36th Euromicro Conference on Real-Time Systems (ECRTS), July, 2024. The proposal, titled “Elastic Scheduling for ARM AR HUD,” outlined an approach for adaptive scheduling to guarantee timeliness in dynamic driving environments for ARM’s proposed augmented-reality heads up display (AR HUD), a system to project information in real-time onto a vehicle’s windshield to enhance driver awareness. It was accepted by three members of ARM Research to be presented during the industrial session.

April 2023: Colloquium, Saint Louis University

Presented a talk titled, “Constrained Optimization of Elastic Task Adaptation in Real-Time Systems” for Saint Louis University’s computer science colloquium.

AWARDS and HONORS:

November 2024: SIES Outstanding Paper Award

The paper entitled, “Improved Implicit-Deadline Elastic Scheduling” was selected as an Outstanding Paper at the IEEE International Symposium on Industrial Embedded Systems (SIES).

May 2023: ISORC Best Paper Award

The paper entitled, “Elastic Scheduling for Fixed-Priority Constrained-Deadline Tasks” was selected as the Best Paper at the 26th IEEE International Symposium on Real-Time Distributed Computing.

Academic years 2020-21, 2021-22, & 2022-23: Honors, Washington University

Received Honors outcome (top 15-20% of students) as a result of annual Periodic Review of Doctoral Students performed by the computer science department.

August 2022: RTCSA Best Paper Award

The paper entitled, “Concurrency Framework for Priority-Aware Intercomponent Requests in CAMkES on seL4” was selected as the Best Paper at the 28th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications.

May 2022: CPS Rising Star

Selected as a Rising Star for the inaugural CPS Rising Stars Workshop held at the University of Virginia on May 26, 2022.

TEACHING:

All listed courses were taught at Washington University in St. Louis.

2023SP: CSE 522S “Advanced Operating Systems”

Co-instructed the course, further refining the material based on feedback and experience from the previous semester.

2022SP: CSE 522S “Advanced Operating Systems”

Co-instructed the graduate level operating systems course that follows CSE 422S. Led an effort to change the focus and scope of the course. Developed new lecture materials and assignments, which composed most of the course syllabus.

2021SP: CSE 422S “Operating Systems Organization”

Performed further refinement of the syllabus, following observations from the previous semester and semester-end student course evaluations. Also assisted with grading final projects.

2020FL: CSE 422S “Operating Systems Organization”

Co-instructed the advanced-undergraduate operating systems course at Washington University in St. Louis, and led a significant restructuring of course content, under the supervision of Professor Chris Gill. Refined content is still being used in the current syllabus.

COLLABORATIONS:

APT (October 2019-Present)

The Advanced Particle-astrophysics Telescope (APT) is a planned space-based observatory designed to localize MeV to TeV transients such as gamma-ray bursts in real time using onboard computational hardware. I am the software lead for the Antarctic Demonstrator for APT (ADAPT), is a prototype high-altitude balloon mission scheduled to fly during the 2025–26 season.

MechWorks (April 2023-August 2024)

A joint collaboration between Purdue University mechanical and structural engineering and the Washington University in St. Louis computer science and engineering department. I developed scheduling theory and platforms to support provably schedulable parallel execution for real-time hybrid simulation (RTHS) of structural response to earthquakes.

STUDENTS SUPERVISED:

During my PhD studies and postdoctoral appointment, I have had the pleasure of mentoring and supervising the work of several talented undergraduate, master's, and PhD students.

Primary Supervision

- Benjamin Standaert, undergraduate student and master's thesis, Fall 2023 through Fall 2024.
 - First author of the paper, "ILP Representations of Multi-Phase Limited-Preemption Tasks."
 - Contributed to the paper, "Towards a Concurrency Platform for Scalable Multi-Axial Real-Time Hybrid Simulation."
- Qinzhou (Nick) Song, undergraduate and master's student, APT collaboration, Summer and Fall 2023, Fall 2024, and Spring 2025.
 - Contributed to the paper, "HLS Taking Flight: Toward Using High-Level Synthesis Techniques in a Space-Borne Instrument."
 - Contributed to the paper, "Front-End Computational Modeling and Design for the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope."
- Brant Yang, REU student, APT collaboration, Summer and Fall 2024.
- Nhan (Bill) Nguyen, undergraduate student, APT collaboration, Fall 2024.
- Alson Yao, undergraduate student, Fall 2024.
- Swapnil Das, REU student, APT collaboration, Summer 2024.
- Ethan Woolbert, undergraduate student, APT collaboration, Spring 2024.
- Jack Heuberger, master's student, APT collaboration, Fall 2023 and Spring 2024.
- Jacob Silbert, undergraduate student, APT collaboration, Fall 2023.
- Ulysses Atkeson, undergraduate student, APT collaboration, Spring 2023.
 - Contributed to the paper, "Front-End Computational Modeling and Design for the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope."

Joint Supervision and Mentoring

- Zhuoran (Jordan) Sun, master's thesis and PhD studies, Fall 2022 though Spring 2025.
 - First author of the paper, "Elastic Scheduling for Graceful Degradation of Mixed-Criticality Systems."
 - Contributed to the paper, "Priority-Based Concurrency and Shared Resource Access Mechanisms for Nested Intercomponent Requests in CAMkES."
- Longhao Huang, master's project, APT collaboration, Spring 2024 through Spring 2025.
- Augustus (Gus) Thomas, undergraduate student, APT and COSI collaboration, Fall 2024 through Spring 2025.
- Tobias Pristupin, undergraduate student, Fall 2023.
- Thomas Liang, undergraduate student, APT collaboration, Spring and Summer 2023.
 - Contributed to the paper, "HLS Taking Flight: Toward Using High-Level Synthesis Techniques in a Space-Borne Instrument."

- Contributed to the paper, “Front-End Computational Modeling and Design for the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope.”
- Contributed to the poster, “Design of Front-end Signal Processing for the Advanced Particle-astrophysics Telescope.”
- Muhan Yu, undergraduate student, Summer 2023.
- Diana Pacheco-Garcia, undergraduate student, Fall 2022.
 - Contributed to the poster, “Design of Front-end Signal Processing for the Advanced Particle-astrophysics Telescope.”
- Will Gozlan, master’s project, Spring and Fall 2022.

SERVICE and OTHER ACTIVITIES:

Journal, Conference, and Workshop Reviewing and Program Committees

- Co-Chair, Workshop on Operating Systems Platforms for Embedded Real-Time applications (OSPRT), July 2025. Held concurrently with ECRTS 2025.
- Reviewer, Transactions on Embedded Computing Systems, Spring 2025.
- Program committee member, Workshop on Optimization for Embedded and Real-Time Systems (OPERA), December 2024. Held concurrently with RTSS 2024.
- Program committee member, Junior Researcher Workshop on Real-Time Computing (JRRTC), November 2024. Held concurrently with RTNS 2024.
- Artifact evaluation program committee member, Euromicro Conference on Real-Time Systems (ECRTS), July 2024.
- Reviewer, IEEE Transactions on Computers, Fall 2022.

Other Conference and Workshop Service Activities

- Publicity chair, RTSS 2025.
- Discussant for paper, Catherine E. Nemitz and Tanya Amert, “Optimizing Lock Granularity for Non-Nested Resource Access under the Priority-Ceiling Protocol.” OPERA 2024.
- Chair of session, “Power-aware, Fault-tolerant Systems.” RTNS 2024.
- Discussant for paper, Gaspard et al., “Feasibility analysis of real-time periodic multi-phase tasks on unrelated multiprocessor platforms.” OPERA 2023.

Thesis and Dissertation Committees

- Thesis committee member, Nick Song, Master of Science in Computer Science, “Generalization of ADAPT HLS Computational Pipeline.” April 30, 2025.
- Thesis committee member, Ben Standaert, Master of Science in Computer Science, “Schedulability Analysis of Multi-Phase Limited-Preemption Tasks.” December 6, 2024.

Advisor, WashU Satellite (Fall 2024-Present)

WashU Satellite is a student-led, primarily undergraduate design team with planned CubeSat and related missions, including the fast-slewing optical ADAPT Incidence Resolution and Imaging Subsystem (AIRIS) to fly as a piggyback instrument with the ADAPT mission. I act as co-adviser and mentor to the group, along with Jim Buckley in the physics department and Andrew Clark in the Electrical and Systems Engineering department.

Postdoc Representative, Physics Department (Fall 2024-Present)

I serve as one of the two postdocs in the physics department to bring questions and concerns from the postdocs to the department faculty, and to attend faculty meetings to report news and departmental issues back to the postdocs.

Computing Committee (Fall 2024-Present)

I currently serve on the Computing Committee for the Department of at Washington University in St. Louis to advocate for students and postdocs and educate them on the availability of departmental computational resources for analysis and simulations.

Graduate Student and Postdoc Advisory Council (Fall 2023-Present)

I currently serve on the Graduate Student and Postdoc Advisory Council to the Center for Teaching and Learning at Washington University in St. Louis. I assist the Center for Teaching and Learning in making decisions related to graduate student and postdoc programming. I also help to coordinate monthly events, including faculty panel discussions and informal gatherings, to allow graduate students and postdocs to gather together and discuss relevant teaching and learning related topics.

Friends of Honduras – Board of Directors (2017-Present)

Friends of Honduras partners with the remote communities surrounding San Marco de Sierra, Honduras to bring medical and educational resources, agricultural support, clean water technologies, and hope to the poorest of the poor in the region. I have served on the board of directors since its inception, and have travelled to the same villages 9 times since 2011 (originally under the umbrella of a different organization).

Graduate Council – Executive Committee (Fall 2020-Spring 2021)

I served as the Computer Science and Engineering department's student representative to the Graduate Council of Washington University in St. Louis. I was also selected to be a member of the Graduate Council's Executive Committee.

CERTIFICATIONS:

Level 1 Actuary

Passed the Society of Actuaries Exam P/1 in January 2011.

PREVIOUS EMPLOYMENT:

Seiler Instrument Saint Louis, MO

From the company's description: *Seiler Instrument is a contract manufacturing company specializing in high precision machining and optical instrument assembly. In addition, Seiler is a distributor of surveying software and instruments, microscopes, and Zeiss Planetarium equipment.*

Information Systems Manager

June 2016-August 2019

My responsibilities included, among others, managing the information systems department; maintaining contracts with hardware and software vendors, telecom providers, and consultants; analyzing business needs and providing solutions to other areas of the company; managing the development of internal applications; and overseeing information security (Seiler is a contract manufacturer for the U.S. Department of Defense and handles Controlled Unclassified Information and export-controlled technical data). Major projects have included:

- The implementation of an on-premise VOIP PBX system
- Installing and integrating a new quality management system
- Networking and setup of new communication and monitoring software for the company's CNC machine shop
- Changes to network security practices as directed by the NIST SP800-171 cybersecurity framework, which allows the company to remain in compliance with DoD regulations
- A major upgrade to the company's ERP system which handles accounting, procurement, manufacturing production, and many other integral company processes.

Network Administrator

July 2013-June 2016

My responsibilities included, among others, internal application maintenance and development; network, server, and database administration; and information security.